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## REPORT OF THE CHIEF OF THE BUREAU OF HOME ECONOMICS, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,  
BUREAU OF HOME ECONOMICS,  
*Washington, D.C., August 31, 1934.*

SIR: I present herewith the report of the Bureau of Home Economics for the fiscal year ended June 30, 1934.

LOUISE STANLEY, *Chief.*

HON. HENRY A. WALLACE,  
*Secretary of Agriculture.*

While carrying out its regular program, the Bureau of Home Economics during the fiscal year just passed directed its activities also to meet, so far as possible, the demands upon the staff for assistance to the emergency and recovery agencies of the Government. The background of factual data resulting from our basic research program made the Bureau an important source of information on consumer problems, on emergency food relief and other relief measures, on nutritive values of diets at different levels of cost, on costs and standards of living, family budgets, and housing and household equipment for both farm and city families. To the extent permitted by its limited personnel, the Bureau has handled many of these emergency problems in addition to its regular work. Of major importance among the new projects were the following:

A study of farm-housing conditions, carried out under a grant of Civil Works Administration funds. This study was directed by the Bureau of Home Economics in cooperation with the Bureau of Agricultural Engineering and other units of the Department.

A study of the cost of living of employees of the United States Government in the District of Columbia, made jointly by the United States Bureau of Labor Statistics and the Bureau of Home Economics.

Revision of commodity lists and specifications for reporting retail prices. In this the Bureau assisted the Interdepartmental Committee on Retail Prices of the Central Statistical Board.

Publication of consumers' guides for household buying, at the request of the National Emergency Council.

Preparation of suggestions for meals for children, for use especially in nursery schools and school lunches provided under the Federal Emergency Relief Administration program.

Planning of a large-scale study of the consumption of farm and industrial products at different income levels.

In view of the interest of various Government agencies in the wider use of electrical household equipment, the studies in this field were expanded somewhat. A bibliography on studies of electric ranges and material on types of ranges available were prepared. We have cooperated with the Electric Farm and Home Authority in the study of the ranges and refrigerators offered for sale under that Authority and have developed laboratories and test methods for measuring the efficiency of both refrigerators and stoves.

### FARM-HOUSING SURVEY

As a feature of the recovery program, for which funds were provided by the Civil Works Administration, a farm-housing survey was made by the Bureau of Home Economics and Agricultural Engineering. The inconvenience of farm-

houses, the scarcity of comforts that are taken as a matter of course in the city, and the widespread lack of even simple facilities for safeguarding health are well-known facts about rural housing. Years of economic depression have, of course, intensified these conditions and tended to lower the standard of living among farm people. Parallel to this social side of the rural-housing situation is the well-recognized economic principle that money spent in improving the farm home tends to increase employment in the building industries and that the wages of industrial workers eventually come back to the farmer in better prices for his products.

With these two points of view in mind, a survey was made of farmhouses representative of conditions the country over. The purposes were: (1) To obtain definite facts and figures on rural-housing needs from the men and women occupants; (2) to work out plans and specifications for building new low-cost rural houses, and for making repairs and improvements on houses now standing; and (3) to suggest methods of financing that would aid in rural improvement and national economic recovery.

The field staff visited over 600,000 farm homes in 352 counties in 46 States and obtained definite facts on some 300 items touching on the structure of the house, water supply, and sewage disposal, light and heat, refrigeration, laundry, and cooking facilities, and so on down to pertinent questions on new installations and construction and acceptable methods of financing. Following up the initial survey, an engineer in each county visited certain selected houses and obtained more detailed data on needed repairs and then worked up a schedule of unit costs after interviewing local dealers, contractors, and farmers.

The survey so far indicates that probably 50 percent of our rural homes are in good structural condition. They may be poorly arranged, and most of them lack modern conveniences, but at least the houses are reasonably sound. This speaks well both for those who built them and for the owners who have taken care of them during these lean years. On the other hand, some 15 percent of the houses need replacement of foundations; between 15 and 20 percent, replacement of roofs; 10 to 15 percent, replacement of floors; about 10 percent, extensive repairs or replacement of exterior walls. Between the extremes of houses in good condition and those needing complete replacement of some part or all of the house is a large group needing extensive repairs of some kind, including much interior refinishing and replacement of exterior paint.

A summary of the survey reports shows that 250,000 farmers hope to build new houses within the next 3 years and that a much larger number wish to remodel their houses and add more conveniences when their incomes permit. In order to assist farm people in planning their improvements the Bureau of Home Economics and Agricultural Engineering cooperated with 20 of the State agricultural colleges and the Civil Works Administration in preparing designs for well-arranged low-cost farmhouses. Forty of these plans are being published in a farmer's bulletin on Farmhouse Plans, and working drawings to be used by carpenters in building these houses are available through the extension services of the State agricultural colleges. Studies were made of kitchen arrangement, storage units, and farmhouse remodeling. Educational material is being prepared to show suggestions for all kinds of remodeling of old houses and for making the most needed repairs. Specifications were prepared for plumbing and heating equipment suitable for farm use. The survey stimulated a renewed interest in home improvement, and there is an increasing demand for material on all phases of this subject.

Since the housing survey showed that a large number of farm people wish to obtain electric service, a detailed study was made in selected areas of present electric-service facilities and desirable extensions both of transmission lines and of uses for electricity on farms. Other special phases of the survey obtained information on rural hospital and library facilities. Thus the farm-housing survey furnished much basic information needed in planning for improved living conditions on farms.

As an immediate relief measure the project gave employment to nearly 5,000 persons, about 4,500 of them women seriously in need of jobs. The personnel included women trained in home economics, agricultural engineers and architects, as well as workers with statistical, clerical, and field experience. The entire project was organized and carried out under the direction of the Bureau of Home Economics.



## ECONOMIC STUDIES

## COST OF LIVING OF FEDERAL EMPLOYEES

Upon the recommendation of the Committee on Government Statistics and Information Services, the staff of the Economics Division cooperated with the Bureau of Labor Statistics in the preparation of index figures of changes in the cost of living of Federal employees from 1928 to 1933. This information was requested by the President as a basis for determining salary reductions required by the Economy Act of 1933. Since it was impossible in the time available to investigate the costs of living of all Government employees throughout the Nation, a study was made of Federal employees living in Washington, D.C. Detailed information was obtained on the expenditures of six groups of employees, representing different salary levels, different family composition, and different types of living arrangements. Complete figures on disbursements for all kinds of goods and services for the year 1932-33, and more limited data for 1927-28, were secured from 366 Federal employees living in family groups and from 123 employees living as single individuals. Further material on expenditures for certain specified items in the first 6 months of 1928 was collected from a larger number of employees. On the basis of these data, consumption weights for the more important items of expenditure were established, 252 commodities and services being included in the list. By applying retail prices obtained in Washington stores to these weighted items, the costs of living for the 1928 base period and for March and December of 1933 were calculated, and the index of changes in cost of living computed.

Two preliminary reports of this investigation have been published, and a more detailed publication is in preparation. This further publication will present the average quantities and costs of the various goods and services purchased by each group of employees studied, and will indicate the methods used in computing the indexes of living costs.

## RETAIL-PRICE REPORTING

The retail prices used in computing these cost-of-living indexes for Federal employees were collected in cooperation with the Interdepartmental Committee on Retail Prices of the Central Statistical Board and with the retail price reporting project of the Civil Works Administration sponsored by the committee and by the Bureau of Labor Statistics. The chief of the Division has served as a member of this interdepartmental committee, and the entire staff has assisted in preparing the material needed as a basis for a more adequate retail price-reporting service within the Government. This work has included the compilation of lists of various foods, articles of clothing, and other commodities for which retail prices should be available (the list heretofore covered by retail-price statistics being revised and greatly expanded), and the preparation of a brief descriptive specification for each commodity whereby price reporters in different towns and cities can identify clearly the kind and cost of the merchandise priced. Members of the Division have also assisted in collecting prices on these commodities in Washington department stores and specialty shops on several different dates, with the dual purpose of testing and revising the lists and specifications and of obtaining prices for the computation of the cost-of-living indexes for Federal employees.

## CONSUMPTION HABITS

Work has proceeded during the year, within the limits of the staff available, on a summary of existing information on food-consumption habits of the population of the United States at different levels of expenditure and on the cost and adequacy of American diets, as shown by the existing dietary studies of rural and urban families. This project is particularly significant and timely in connection with the work of the Program Planning Division of the Agricultural Adjustment Administration. Recognizing this fact, the A.A.A. has detailed 395 days of clerical assistance to expedite certain phases of this work.

Time has also been given to planning a large-scale study of the consumption of farm and industrial products at different income levels in different types of communities and regions. The information which such an investigation

would furnish is urgently needed in connection with the recovery program and with the long-time programs of various governmental agencies, as a basis for planning production and distribution, for adjusting wages and purchasing power, for measuring changes in cost of living, for formulating programs of consumer education, and for improving living conditions in certain areas. The existing information on the consumption habits of the population is totally inadequate for these present purposes, as it covers only a small proportion of American families, and is in large part now obsolete. Although funds have not been made available for a comprehensive investigation of consumer expenditures, contacts have been made with several States for cooperative studies of selected groups of families, and it is planned to begin the initial studies within the next few months. The plans for this investigation have been made in consultation with the Bureau of Labor Statistics and other governmental agencies interested in this field of research, so that the work may be coordinated with the studies of other agencies and the results made of maximum usefulness. In connection with the coordination of governmental activities in this field, a member of the staff has served as chairman of a subcommittee on consumption and cost of living studies appointed by the Committee on Statistical Programs of the Central Statistical Board.

#### ANALYSIS OF FAMILY-LIVING STUDIES

With the cooperation of the Social Science Research Council, Harvard University, and the Institute of Pacific Relations, a report has been prepared on Studies of Family Living in the United States and Other Countries: An Analysis of Material and Method. This publication will serve as a valuable source book on existing information on consumption, standards of living, and living costs, and will provide research workers undertaking new studies in this field with an evaluation of the technics used in collecting and analyzing data. Brief abstracts are presented of 465 studies of family living made in the United States and Canada, and of more than 1,100 studies made in other countries. These annotations are preceded by introductory chapters summarizing the history of studies in this and other countries and evaluating the methods used in studies made by the Le Play school and by the statistical schools. An index to materials and to methods, as well as an author index, will enable the student to locate readily the material in which he is interested. Carle C. Zimmerman, of Harvard University, is a joint author of the report. He prepared the material dealing with studies made in countries other than the United States and Canada. Two preliminary reports of the annotated bibliographical section were published earlier in mimeographed form.

#### FOOD BUDGETS

The food budgets at 4 levels of nutritive value and cost, mentioned in last year's annual report, came from the press in November and December 1933 in the form of 2 publications, Circular 296, Diets at Four Levels of Nutritive Content and Cost, and Miscellaneous Publication 183, Food Budgets for Nutrition and Production Programs. These publications have had wide circulation, and the material has been put to many uses. Social agencies, particularly relief workers, have used the data as a basis for determining food allowances for individual families and institutional groups. Teachers have used it as an aid in nutrition instruction. The Extension Service has used it in helping to guide home food-production programs of family groups and in planning cooperative living for groups of college students. In addition, these publications have had wide circulation among economists who are interested in raising the level of living in this country. Popular interpretations are now being prepared which will adapt this material to the situations faced by the city family and the rural family.

To give help on the child-feeding problems created by the establishment of nursery schools and the provision of school lunches under the program of the Federal Emergency Relief Administration, two mimeographed publications were prepared in this Division: (1) Noon Meals for Nursery Schools, and (2) School Lunches, with Recipes to Serve 50 Children. The material for preschool children was based largely on the Bureau's experience at the National Child Research Center. The school-lunch suggestions were prepared in cooperation with the Food Utilization Section of the Bureau.



At the request of the Federal Emergency Relief Administration, the full-time services of one member of our staff was loaned for 2 months to the Federal Surplus Foods Corporation to assist in the allocation of surplus commodities to the various States.

#### CONSUMER PURCHASING

Besides cooperating with the Division of Textiles and Clothing in preparing Miscellaneous Publication 193, Present Guides for Household Buying, discussed under another heading, the Economics Division has been able to assist in furthering the interests of consumers through the services of a member of the staff acting as chairman of the Committee of the American Home Economics Association on Standardization of Consumers' Goods, and as representative of that organization on the council of the American Standards Association. She has also been chairman of the Committee on Consumers' Interests of the American Association of University Women.

Much time has necessarily been given by all members of the staff to meeting innumerable requests from individual homemakers throughout the country for help in spending the family income and in adjusting housekeeping practices to meet the depression. Similar requests come daily from relief agencies, teachers, extension workers, and other groups. Considerable time has also been given to preparing material on minimum family budgets and on consumer expenditures at the request of governmental agencies concerned with various aspects of the recovery program.

#### FOODS AND NUTRITION

The planning program of the Agricultural Adjustment Administration focused attention as never before on the nutritive value of foodstuffs and different types of food products. At the same time the food-distribution programs of emergency relief agencies offer an unparalleled opportunity to make available to a large group of our population not only more nutritious foods but some knowledge of their nutritive value and best uses. This has developed an unprecedented demand for information from the Bureau's food composition, nutrition, and food-utilization sections.

#### FOOD COMPOSITION

The scientific data assembled and analyzed by this section of the Bureau provide very necessary information for evaluating the national food supply or planning changes in production, processing, or distribution of food commodities. Information as to the composition and nutritive value of competing agricultural products has been furnished to the A.A.A., and similar service with regard to food supplies has been rendered to Federal and State relief agencies and to the Civilian Conservation Corps.

Such demands were given precedence over the usual program of this section, but two new projects were undertaken, and the regular work of collecting and analyzing food-composition data was continued.

A survey of available information on the mineral content of foods produced under known conditions has disclosed the need for a comprehensive study of the distribution of calcium, phosphorus, iron, and copper in food materials. A cooperative plan for such work has therefore been formulated, and as a result, new work is being undertaken in various States in universities and experiment stations. The Bureau is serving as a coordinating agency in this enterprise.

In response to the need for a uniform system of grouping foods with regard to their carbohydrate content, this section of the Bureau, in cooperation with the American Dietetics Association, has prepared a new classification of fruits and vegetables. This classification, which will reduce the errors in computing diabetic and other special diets, is being tried out in tentative form in hospital practice. A paper on the subject is being prepared for publication.

#### NUTRITION STUDIES

The popularization of the newer knowledge of nutrition has caused shifts in consumer demand for the different groups of foods. If this changing demand is to be guided so as to be of greatest use to both consumer and producer, we need to know more about the vitamin content of foods and more about the

minerals they contain. But we must also know the effect of production and handling methods on the nutritive value of the food, and the optimum requirement for these nutrients in the human diet.

Since the staff of the nutrition section is small, the laboratory work to date has been directed toward obtaining data on the vitamin content of different foods, and to a study of the nutritional significance of minerals that occur regularly in foods but only in minute amounts. Those studies are important from the standpoint of supplying data needed by the dietitian for planning everyday meals. They are equally important in the planning of production programs, if the new knowledge which scientists have gained about food values is to be applied in the improvement of the national food supply. The vitamin studies are continuously bringing out the importance of the so-called "protective foods", milk, fruits, and vegetables.

In addition to the laboratory analyses of foods for their vitamin content, there is need for studies to determine the vitamin requirement for different age groups; different degrees of activity, and for different physiological conditions, such as growth, pregnancy, and old age.

#### VITAMIN VALUES

This section, in cooperation with the Office of Experiment Stations, is collecting, analyzing, and tabulating all available data on the vitamin values of the common foods.

Laboratory studies were made of the vitamin A content of eggs in relation to the diet of the hen. Previous studies showed that the vitamin D content of hen eggs can be increased by adding viosterol to the hen's food, and the present study was made to determine, similarly, the relation between the vitamin A content of the hen's diet and the storage of this vitamin in the egg, and also the influence, if any, of viosterol on the storage of vitamin A in the egg. Cod-liver oil was used to supply the vitamin A. The experiments show that the vitamin A content of the eggs was proportional to the cod-liver oil content of the diet, irrespective of the amount of viosterol used.

Liver is a most important food product because it is such an excellent source of many nutritive essentials. It is known to be rich in vitamins A and G and a good source of vitamin B. It also contains iron and the anti-anemic principle. Little has been known, however, about its vitamin D content.

In the Bureau's nutrition laboratory four kinds of liver were tested for vitamin D and beef and pig liver were found to be about equal in potency. Both may be considered fair sources of vitamin D. Sheep liver had less of this vitamin than either beef or pig liver, but was apparently richer than calf liver.

#### MINERAL VALUES

Selenium is found in varying amounts in food products grown in certain types of soil. To determine its effects the Bureau is experimenting with small quantities in the diet of the rat. Preliminary tests were made to determine the rate of storage in the different organs. These tests were paralleled with others to determine the rate of elimination after the animals were returned to a diet containing no selenium. The storage of selenium in the different organs does not seem to be cumulative. All of it was apparently eliminated when the animals were returned to a normal diet, although the lesions that developed during the time selenium was being ingested did not heal.

A study of the minerals in eggs from hens fed on a mixed diet was made by means of a Littrow-type spectrograph. Eighteen elements were definitely identified, and five others were noted as probably present.

Sesame seed, which is grown to an increasing extent in the Southwest, is rich in calcium. Since the most common dietary deficiency in this country is calcium, tests were made to determine whether the calcium of sesame seed is in a form utilizable as food. Preliminary tests were affirmative. Rats fed on a calcium-poor diet supplemented with sesame seed showed no pathological evidence of calcium deficiency, indicating that they were able to make use of the calcium in the sesame seed.

Material for a set of lantern slides entitled "Selecting Foods for Good Nutrition" was prepared in cooperation with the Economics Division. Illustrations of animals showing mineral and vitamin deficiencies were included



as well as photographs of foods that should be used to supply the various essential nutrients.

The nutrition charts previously published have been completely revised, and the new series, to consist of 11 charts instead of 9 as formerly, will soon be available.

#### FOOD UTILIZATION

This section has assisted the Federal Emergency Relief Administration and other agencies by providing directions for advantageous use of foods distributed by the Federal Surplus Relief Corporation; by suggestions to housewives on the preparation of low-cost foods; by preparing quantity recipes for use in school lunches and at transient relief centers; by cooperative studies with the dried-milk industry to work out a formula for increasing the milk solids in the diets of young children; and by special experiments to develop emergency methods of canning beef, veal, and mutton in the drought areas.

These emergency undertakings were carried out in addition to the regular program of research and experimentation in this section.

#### MEAT CANNING

Three methods of precooking beef for canning were studied, namely, exhausting raw meat in cans in a water bath, exhausting raw meat in cans in the oven, and pot-roasting the meat before placing it in the cans. Examination of the canned meat after 6 months of storage showed little difference in flavor or other qualities of the meat exhausted in the can, but the pot roast was significantly less desirable in flavor than the meat prepared by the other two methods.

In answer to requests for a greater variety of canned-meat products, formulas were developed for canning beef in the form of stews, goulash, steak, steak and onions, and meat loaf. Unless, however, there is some special reason for having a ready-to-serve mixture, the Bureau recommends canning the meat alone, with no seasoning except salt, with no vegetables, and with no gravy other than unthickened meat juice or broth. It can be used in any desired mixtures after the can is opened, and the dish is better flavored when the foods are freshly mixed.

Beef tongue, brains, kidneys, liver, heart, and sweetbreads from veal were also canned successfully. But it is recommended that these parts, with the exception of beef tongue, be canned only when they cannot be used economically while fresh.

A series of tests were made to find methods of handling that would prevent the loss of liquid from glass jars in pressure cookers during processing under pressure, a difficulty not entirely overcome in any of the methods usually recommended. Jars of the automatic or self-sealing type lose less liquid than the screw-top or wire-bail types. However, the self-sealing jars require special protection from drafts after being processed, or they may explode. This difficulty is lessened by leaving 1 inch of head space in these jars, or filling the jars only to the collar.

#### EGGS

Because of market discrimination against so-called thin egg white, studies were made in this section comparing the behavior and chemical factors in whole white, and thick and thin white separated mechanically. Since egg white is important as a means of adding air, the volume and stability of the egg foam were measured, and practical tests were made with angel cake.

In all samples of egg white tested, the foam reached maximum stability after 75 to 90 seconds of beating with the second speed of a power egg beater, and the egg white at a temperature of 77°F. With this time of beating the thin whites yielded the largest foam volume, but the foam from thick whites was more stable than that from the thin whites regardless of the time of beating, which ranged from one-half to 4 minutes.

A comparison of the quality of angel cake from whole egg white and separated thick and thin egg white, correlated with the total solids in each case, indicated that with total solids of 12 percent, which is the normal value, whole egg whites and thick egg whites produce a lighter and more tender cake than the thin whites. Dilution of the whole and the thick whites with water increased the compressibility or softness of the cake. With the thin whites the

cake was heavier and less tender. With 10 percent of total solids the three types of whites gave almost identical results for lightness, softness, and tenderness. The study indicates that the best angel cakes can be made from undiluted egg white, although satisfactory cakes can be made with not over 10 percent of water added to the white.

#### FATS

Animal and vegetable fats were compared in a series of tests to determine whether a difference in temperature is required to yield the most satisfactory results in deep-fat frying. Doughnuts cooked in a prime steam lard and a hydrogenated cottonseed oil at three temperatures (365°, 383°, and 392° F.) showed no significant difference in quality.

A further comparison of fats in frying was made with potato chips. The fats used were three kettle-rendered lards produced by the Bureau of Animal Industry at Beltsville, Md., from animals fed respectively a peanut, corn, and brewer's rice ration, and a representative sample each of prime steam lard, hydrogenated lard, hydrogenated cottonseed oil, and highly refined corn oil, cottonseed oil, and peanut oil. The potatoes were of the Green Mountain variety harvested by the Bureau of Plant Industry at Presque Isle, Maine. The chips resulting from repeated fryings in each fat showed little variation except in luster and flavor.

Cottonseed oil, peanut oil, lard from peanut-fed hogs, and corn oil gave a high luster to the chips. Hydrogenated cottonseed oil and prime steam lard gave a medium luster, while hydrogenated lard from corn-fed and rice-fed hogs gave a significantly duller luster than the other fats.

Peanut oil and corn oil gave the most desirable flavor to the potato chips but these two flavors were not significantly different from each other. All the vegetable fats tested gave a more desirable flavor to the potato chips than the lards.

Peanut oil gave the best general results in frying potato chips, although the difference between it and the other vegetable oils was not important. Corn oil, cottonseed oil, and hydrogenated cottonseed oil were found to be about equally desirable as a frying medium for potato chips. Lard from peanut-fed hogs and hydrogenated lard were next in desirability. Lard from corn-fed and rice-fed hogs and prime steam lard ranked together, but were less desirable than the other fats for this use.

The amount of fat absorbed by the potato chips fried in the various fats was not significantly different.

Storage tests showed that potato chips fried in any of these fats while fresh and stored in white glassine bags at room temperature did not develop rancidity up to 25 days.

During 8½ hours of frying the lards developed about 0.2 percent of free acid calculated as oleic acid above that initially present. The vegetable fats developed about 0.1 percent. The iodine numbers of all the fats decreased during frying. The decrease was rather uniform, ranging from 3 to 5 iodine-number units. The peroxide values of the fats after the last frying approached those of fats beginning to show rancidity in odor or taste. From the first to the last frying, as shown by the judgments on the chips from each successive frying, there was no significant difference in the rate of deterioration of the fats.

Samples of prime steam, dry-rendered, and kettle-rendered lard, together with a hydrogenated lard, a hydrogenated cottonseed oil, and a compound made from oleostearin and cottonseed oil, were used in studies of fat flavor. Hot biscuits were used as the medium for measuring the intensity and desirability of flavor and of aroma of these fats. Analysis of the data showed that the fats with the least aroma and flavor were most acceptable for use in biscuits. These were kettle-rendered lard, hydrogenated lard, and hydrogenated cottonseed oil.

#### MEAT

In cooperation with the Bureaus of Animal Industry and Agricultural Economics and State experiment stations, the study of meat quality has been continued. The work of the past year included the cooking of about 500 cuts of meat from experimental animals for palatability tests, continuation of experiments to determine the effect of roasting temperature on the shrinkage and quality of meat, a start in the preparation of a technical bulletin on the



shrinkage of beef, the publication of a technical bulletin on the shrinkage of lamb and mutton, and the publication of popular educational material on meat cookery.

Technical Bulletin No. 440, Shrinkage (loss of weight) and Heat Penetration During the Roasting of Lamb and Mutton as Influenced by Carcass Grade, Ripening Period, and Cooking Method, analyzes the data from 1,185 legs of lamb and mutton, ranging in grade from Choice to Cull, ranging in ripening period from 2 to 24 days after slaughter, and roasted by seven different methods. The bulletin brings out the following general points:

The higher the grade of lamb and mutton the greater was the shrinkage during cooking, due mainly to the rendering out of more fat into the pan drippings from the better finished high-grade meat. Choice, Good, and Medium grade legs of lamb cooked more rapidly in proportion to their weight than lamb of Common and Cull grades.

As the ripening period increased beyond 2 days after slaughter the cooking shrinkage became less, offsetting some of the loss of weight in the cooler during storage. The rate of heat penetration became more rapid, suggesting that there would probably be less fuel required per pound of meat cooked as the ripening progressed.

For lamb roasted medium to well done (169° F. on a meat thermometer in the thickest part of the leg), the lower the oven temperature the less was the shrinkage. But for lamb roasted to the well-done stage (181° F.) there was no saving in shrinkage through the use of low oven temperatures because of the long time required. The stage to which leg of lamb was cooked, whether to 169° or to 181° F., made more difference in shrinkage than the range of 90° between 257° and 347° F. oven temperature. These results bring out an important point in meat cookery with respect to controlling the shrinkage and also furnish a good argument for the use of a roast-meat thermometer in addition to an oven thermometer. The meat thermometer shows when the desired stage of doneness is reached and prevents overcooking and excessive shrinkage.

As educational material on meat cookery, the series of 50 lantern slides entitled "Cooking Meat According to the Cut", which was a feature of the Bureau of Home Economics meat exhibit at A Century of Progress in Chicago during the summer of 1933, is now available as a film strip, in black and white, with accompanying lecture notes. A set of seven meat-cooking charts, 20 by 30 inches in size and printed in black and white on heavy coated paper has been published. These charts contain some of the same photographs used in the film-strip series and illustrate the principles of roasting and broiling tender cuts, stuffing and cooking low-cost tender roasts, braising less-tender cuts, and preparing ground meat in savory ways.

#### POTATOES

In continuation of the quality study of potatoes undertaken in cooperation with the Bureau of Plant Industry, samples of three varieties of potatoes—Chippewa, Green Mountain, and Russet Burbank—grown in 24 locations, were studied to ascertain whether variability due to widely varying conditions of environment was greater for one variety than for another. The quality of Chippewa was found to fall into three grades and that of Green Mountain and Russet Burbank into four grades, showing a wide range of cooking quality for all three varieties. From the data it was evident, however, that the cooking quality of the Chippewa was consistently poorer than that of the Green Mountain and Russet Burbank.

For purposes of selection for breeding studies, about 50 seedling varieties of potatoes were cooked and judged for quality.

#### SOYBEANS

Thirteen varieties of soybeans, native to Chosen and Japan, grown at the Arlington Experimental Farm and at several experiment stations throughout the United States, were judged for quality as a green bean in the Home Economics laboratories in cooperation with the growers. Comparison of the data from the different laboratories shows that environment made a vast difference in the quality of the soybeans. Some grown in one locality and found to be the best there were the poorest when grown in a different locality. Several



of the varieties, especially the Hahto, Rokuson, Cha mame, Higan mame, and Easy Cook, made a very desirable green vegetable, having a mealy texture, a sweet, nutty flavor, and a short cooking period.

#### RICE

Cooking and soup-canning tests were made on a number of samples of rice sent in from some of the different localities in the Southern States, also on one from Dutch Guiana, South America. None of the samples was found to equal Patna either as boiled rice or in soup.

### TEXTILES AND CLOTHING

To meet the demands for emergency service during the year, the Textiles and Clothing Division, with its limited staff, reduced its regular work as much as could be done without loss of costly experimental material produced over a period of years in connection with long-time projects. These emergency services included assistance in work on consumers' standards; in the compilation of lists of textiles and clothing, together with the specifications, for use in a Government survey of retail prices; in studying market shifts of competing textile products; in the preparation of instructions for use in work-relief projects; and the assembling of available guides for household buying.

The chief of the Division was appointed a consultant on the Consumers Advisory Board of the National Recovery Administration and has served in that capacity throughout the year. She has assisted in the preparation of briefs presented by the board at code hearings, advised concerning code provisions to be requested by the board in order to afford greater consumer protection, and assisted with reports issued to the public by the board on the need of standards for consumer goods.

The Division cooperated in the work of listing textile commodities to be used by the Committee on Retail Prices of the Central Statistical Board as a basis for a price survey of the United States, and prepared specifications for the clothing and household items on this list. Almost the entire staff of the Division was assigned to this work for a time to accumulate the necessary data, and two members worked with the committee in formulating the final recommendations.

A member of the Division worked on the linen and silk-rayon subcommittees which were formed by the Cotton Processing and Marketing Section of the Agricultural Adjustment Administration to study shifts from cotton to other fibers resulting from a processing tax imposed upon cotton as proposed by section 15-d of the Agricultural Adjustment Act.

The Division has supplied instructions to the Federal Emergency Relief Administration for making cotton mattresses, cotton bed comforters, quilts, sheets, pillowcases, and towels. These have been used as a basis for the work-room regulations issued by that organization. Two members of the staff, together with a representative of the Bureau of Agricultural Economics, wrote specifications for the ticking, toweling, and other fabrics needed for these articles. These specifications were used in purchasing the large quantities of fabrics distributed by the Federal Emergency Relief Administration throughout the country for relief purposes. A suggested list of patterns and sizes needed for the small-factory production of clothing was also prepared for the Relief Administration, as well as specifications for clothing fabrics, and data on the yardage needed for such garments.

Members of the clothing section of the Division worked with the local representatives of the Administration in selecting, cutting, and making alterations in patterns to be used in the workrooms. About 30 patterns were supplied, together with mounted construction helps for each type of garment. Model garments were provided for a few articles.

At the request of the National Emergency Council, a 31-page bulletin entitled "Present Guides for Household Buying" was prepared by the chief of the Division in collaboration with a member of the staff of the Economics Division. This publication was distributed to the consumers' county councils organized under the National Emergency Council. It summarizes, for the first time, the existing types of consumer guides which are of national significance, such as standards and grades developed by the United States Department of Agriculture, commercial standards promulgated by the National Bureau of Stan-

dards, American standards published by the American Standards Association, and "certification" or "approval" activities of national trade associations in this field. These guides include quality grades now in use for food products, clothing and textiles, household equipment, furnishings, and other commodities. A list of 119 references directs consumers to the source of detailed information concerning each buying guide. The bulletin bears directly on the subject of standards for consumer goods, one of the important consumer needs which have been widely discussed during the past year.

#### QUALITY GUIDES FOR CONSUMERS

To be able to judge the quality of textile goods, the average purchaser needs specific help. The Bureau has accordingly begun publication of a series of leaflets suggesting points to consider when buying certain articles of clothing or household furnishing. Leaflet 105, *Quality Guides in Buying Ready-Made Dresses*, stresses the qualities of fabrics and dress construction which make for economy in purchasing these garments. The wide range of values now shown on the market make it difficult for the purchaser to find those best suited to her needs and pocketbook. The characteristics of cotton, silk, rayon, and wool fabrics, the type of seams and finishes, and the cut and fit of the dress all contribute to its durability and satisfaction in use. These as found in poor- and good-quality dresses, are discussed in detail. The leaflet is supplemented by a set of charts showing good and bad examples of clothing for children. An analysis of the purchasing information now available to consumers through labels on various types of clothes is another approach which has been made to this problem of wise selection of ready-made clothing.

Leaflet 103, *Quality Guides in Buying Sheets and Pillowcases*, enumerates the characteristics of a good sheet, such as quality in fiber, yarns, thread count, weight, and weave. The length of service to be expected from a sheet, and Federal specifications for both sheets and pillowcases are also discussed.

A similar leaflet on buying household blankets is in preparation. This is based partly on an analysis of 25 blankets purchased on the retail market and analyzed for weave, type and kind of yarn, fiber composition, weight, thickness, thread count, yarn twist, heat transmission, air permeability, fiber-length distribution, bursting strength, and resistance to abrasion. The results of this investigation will be published in a technical periodical. They show the great variation in the properties of blankets now on the market and emphasize the need of labeling with information not only as to size and fiber content, but also as to heat transmission and strength.

#### HOME SEWING

The present economic situation has focused attention on home sewing as a means of extending the family income. Mimeographed circulars such as *Clothing Economies*, *Supplies and Equipment that Aid Home Sewing*, *Hat Economy*, and *Instructions for Making a Cotton Mattress* have all been issued in response to the demand for assistance along these lines.

Two exhibits were prepared suggesting ways of using to the best advantage typical old garments and used materials. These exhibits have been in constant use by extension and relief agencies and are scheduled several months in advance. In order to assist those to whom the exhibits could not be sent and as a supplement to these exhibits, several duplicate sets of cards were prepared bearing photographs of pattern lay-outs on old garments and of the finished garments, together with special suggestions for making them.

The Division's four regular exhibits, consisting of recommended designs for clothing for infants, creeping babies, and children, have continued to tour the country in response to requests. In addition to the wide variety of organizations that ordinarily use them, training schools for teachers preparing to serve in emergency-relief schools have made use of them during the past year. An increasing number of retail stores are promoting merchandise developed along lines recommended by the Bureau, and these also have made use of the clothing exhibits during the past year.

In cooperation with the National Child Research Center, new designs for children's garments have been developed in this Division, and the patterns are being made by commercial pattern companies. Other designs have been improved. To date 8 cooperating commercial pattern companies are producing patterns for 32 designs developed by this Bureau. Manufacturers of ready-



to-wear garments are readily accepting the principles worked out here and incorporating them in designs which are now to be found in practically all large department stores.

### NATURAL DYES

In order to meet the many requests from homemakers and handicraft workers for instructions in the use of vegetable dyes, a mimeographed circular entitled "Home Dyeing with Natural Dyes" has been prepared. This information has found immediate use in Federal and State relief centers where handicraft work is being initiated and encouraged.

As a basis for this publication, wool and cotton fabrics were dyed with all the commonly used natural dyestuffs, and samples of each were tested for their fastness to light and to washing. Although some dyes were found to fade and change quickly, there are also many which have good color fastness. Only those recipes which produced fast colors were included in the publication.

Many of our very common and readily available plants yield satisfactory dyes. Very pleasing colors are obtained from apple bark, oak bark, onion skins, juniper berries, coreopsis flowers, laurel leaves, black walnut hulls, and the wood of the Osage-orange tree. Other materials of interest to handicraft workers, such as fustic, indigo, madder, and cutch, also produce good fast colors.

### COTTON-UTILIZATION INVESTIGATIONS

To study the effect of conditions of growth of the cotton on the wearing qualities of the finished cotton goods, sheetings made from nonirrigated, irrigated, and a mixture of the two cottons were put into service in a Washington hotel. Sheets are removed at regular intervals of 25 washes and tested for physical and chemical deterioration.

Up to 50 washes, the deterioration is not appreciably different in the various sections of the sheet. All three sheetings were found to shrink approximately 8 percent in length, and increase approximately 2 percent in width. The most shrinkage occurs with the first wash, but slight shrinkage continues with successive launderings, until after 15 washes it is negligible.

The amount of starch present in the finished fabrics and also the amounts remaining in those washed 1, 3, 5, 10, 25, and 50 times were determined. The first laundering removes a large percentage of the starch; a measurable amount is still present after the twenty-fifth wash, but not after the fiftieth. The ash content for all three of the sheetings increases steadily with service. The copper-number tests on the unbleached fabrics show that the sheeting made from irrigated cotton contains more impurities of a reducing nature than do the other two sheetings.

Ironing studies have been continued to determine the effects of pressure on deterioration of the fabric at different temperatures and under varying periods of still contact. Tests were made with pressures varying from 1 to 4 pounds per square inch, a range which includes the pressures commonly found in household ironers. Special attention was given to pressures from 3.5 to 4 pounds, which are sometimes attained in hand-ironing. When at these higher pressures desized sheeting materials were run through the household ironer on a cool roll with a sliding contact of  $2\frac{1}{2}$  seconds, changes in surface reflectance, indicating scorch, were observed at temperatures as low as  $411^{\circ}$  F. This is fully  $63^{\circ}$  lower than temperatures producing the same change for pressures from  $1\frac{1}{4}$  to  $1\frac{1}{2}$  pounds per square inch. Chemical damage also was indicated at temperatures 54 to 63 degrees below the low point with the lower pressure range. It is important to check on the temperature of the roll as well as that of the shoe. When the initial surface temperature of the roll was approximately  $248^{\circ}$  F., and the pressure high, chemical damage was detected with shoe temperatures as low as  $390^{\circ}$  F., and changed surface reflectance with temperatures as low as  $370^{\circ}$  F.

Samples ironed at temperatures at which there was no measurable scorch were examined under the microscope. When more than one layer of fabric, as in hems, were ironed on the revolving roll at the higher pressure, the microscope revealed definite ridges between the indented packing of fibers at the intersections of the warp and filling yarns.

Studies were made with the higher pressures on the household ironer for periods of 1 to 20 seconds. With a contact of 20 seconds, indications of scorch were observed for temperatures between  $275^{\circ}$  and  $284^{\circ}$  F. These tests confirmed the greater resistance of the low grade of cotton. Strict Good Ordinary



cotton showed higher resistance than Middling and Good Middling cotton as measured both by copper number and by surface reflectance.

Wherever chemical damage was produced by ironing, the same reducing type of oxidized cellulose was obtained in contrast to that produced by wear and laundering. Additional proof of the presence of this reducing type has been given by the large decrease in the copper number of samples scorched and then boiled in dilute alkali.

That surface layers of scorch have a protective value against additional damage on repeated ironing was apparent from measurements on scorched samples conditioned and reironed at high temperatures and pressures. The hygroscopic moisture content of the scorched samples was found to be less than that of those undamaged by ironing.

The suggestion of sweetpotato starch for use as a finish for cotton fabrics led to comparisons in our laboratory with other starches, such as wheat, corn, rice, dasheen, canna, and potato. The stiffness of four plain-weave cotton materials of different weights, sized with these different starch pastes, was measured on the stiffness-testing apparatus devised in this laboratory. In general, the results show that sweetpotato starch is similar to rice, wheat, and corn starches in stiffening power, most closely resembling rice starch.

### WOOL-UTILIZATION INVESTIGATIONS

Study of the relative merits of different wools when made into blankets is being continued. Various grades of new and reworked wool used alone, and blends of good-quality new wool with poor-quality new wool, reworked wool, and mohair are being tested by subjecting them to controlled wear and laundering. An apparatus built for measuring the amount of heat transmitted through a blanket is now used to study the effect of service upon the heat-retaining properties of blankets. With increasing service and as the grade of the wool becomes poorer, the ash content and the methylene blue absorption of the fabrics was found to increase and the sulphur content to decrease.

A method has been developed for measuring damage in wool by means of methylene blue absorption, and a paper describing this method was prepared for publication. The procedure adopted is simple, gives accurate, reproducible results, and can be used on fabrics or raw wool, and on undyed or dyed materials.

The methylene blue absorption of woolen materials was found to increase as they were damaged progressively under controlled conditions. The addition of reworked wool to fabrics raises the absorption materially. A linear relationship was shown to exist between methylene blue absorption and strength measurements. It was also observed that the rate of methylene blue absorption of wool decreases as the absorption value decreases. When the volume of methylene blue is kept constant, the absorption varies with the weight of wool taken for analysis.

### INFORMATION DIVISION

The emergency activities of the research divisions were reflected in the output of the Information Division. For example, in the illustrated articles for newspaper syndicate services, dishes for low-cost diets were emphasized, clothing economies pointed out, and scientifically sound methods for canning, both at home and in community centers, explained as economy measures and for health protection. The press release entitled "The Market Basket" was again issued weekly and distributed to newspapers, large relief agencies, and the county home demonstration agents, to give timely suggestions on low-cost meals and interpret the findings of nutrition research for the benefit of homemakers desiring to obtain the most food value for a limited expenditure of money. Special articles on food values, and suggestions on household purchasing, were contributed regularly to the Consumers' Guide, issued by the Consumers' Counsel Division of the Agricultural Adjustment Administration.

By means of the radio talks broadcast from Washington on the Farm and Home Hour by a member of the staff, all this information was also given to the public. The script service to radio stations for local broadcast was continued, and over 200 radio stations are now receiving this service on request.

Several new film strips were added to the series circulated through the Extension Service, and a set of seven wall charts illustrating the principles of meat cookery were issued and placed on sale at the Government Printing Office.

